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TC 1700

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



In re application of

David P. STRAUSS et al.

Serial No.: 08/881,948

Group Art Unit: 1753

Filed: June 25, 1997

Title: Mechanically Joined Sputtering  
Target and Adaptor Therefor

Examiner: R. McDonald

DECLARATION UNDER 37 C.F.R. §1.132

Assistant Commissioner for Patents  
Washington, DC 20231

Sir:

I, Thomas J. Hunt, hereby declare and state:

1. I am a co-inventor of the above-referenced application, and as such, am extremely familiar with the subject matter, as well as the various patent prosecution documents, including the references cited in these documents. I have worked in the materials science field for approximately twelve years and currently am a Senior Research and Development Engineering Technician with MRC, a division of Praxair Electronics, a position I have held since 1994. Prior to that time, I served as a Research and Development Engineering Technician, a position I held from 1990 to 1994. I have extensive experience, not only in the field of materials science, but also in the field of sputtering target and backing plate design, manufacturing, and assembly, as shown in my resume, and which is attached for the Examiner's convenience.


2. I have studied the abstracts, translations and full text of the documents applied (i.e., Wegmann et al, Inoue, Fujitsu, Hitachi and Zejda).

3. Fujitsu does not teach the sputter target attachments as described in the present application. Particularly, the present application recites a novel method of removing the target material from the integral backing plate which is not apparent to one skilled in the art after understanding that Fujitsu discloses the use of a target manufactured from a single material. In this regard, Fujitsu describes a method of affixing target material to a backing plate from the sputter surface but does not disclose a means of attaching the target material, by means of screws, from the backside of the backing plate where the water cooling takes place. The present invention, as described in the application, overcomes the difficulty of a water to vacuum seal required for sputter target integrity, which was not considered in Fujitsu. Any attempt to apply Fujitsu to a similar product in the fashion described would have a negative result on the product and quite possibly result in making the product unusable for semiconductor applications.

4. The method of mechanical attachment of a sputtering target as taught in Zejda is not related to the method of sputtering target and adapter, as in the present invention. While Zejda teaches that a water-cooled sputter target can be produced using screws it is unlikely one skilled in the art would make the assumption of using a similar system to produce a water to vacuum seal. Zejda effectively teaches that a water-cooled target assembly, as a separate unit, assembled with screws, can be installed in a quick connect device. While it can be inferred that a mechanically assembled sputter target is feasible it does not

address neither the type nor style of target in the application. Thus, it would not be readily apparent to one skilled in the art to look at Zejda to solve the assembly issues which the present invention addresses. That is, Zejda does not teach a method that a replacable target material can be attached to a sputtering machine where a water to vacuum seal is of critical importance.

5. The issue of threaded holes as addressed in the office action in light of Zejda and Fujitsu is not relevant to the application. While Zejda and Fujitsu teach a method of target attachment, the methods described are either to attach a target to a target mount as part of a sputtering machine, or to assemble a target for attachment to a quick connect fixture as part of a sputtering machine. The present invention seeks to manufacture a target which can be mounted to a sputtering machine by use of an adapter which formerly had been an integral part of the target assembly by either manufacturing the assembly from a single material or joining the target material and backing plate using various bonding technologies.

 6. Fujitsu is further encumbered by an additional mis-translation. Referring to the target mounting surface of the sputtering machine as the target "backing plate" is incorrect and does not comply with the semiconductor industry's norm of reference applied to a sputter target "Backing plate". The area specified is commonly referred to as the "Mounting Plate," which is usually an integral part of the sputtering apparatus.

7. Referencing Fujitsu, it is generally understood by a worker of average skill that the holes passing through the Fujitsu target backing plate would not be threaded as they are intended to allow clearance for the screws to connect with the

threaded holes in the mounting plate. Additionally, using threaded holes in a mounted target backing plate in this fashion would make a tight mechanical seal difficult without damage to the threaded holes in the backing plate as a result of tightening the screws to the mounting plate through the threaded holes of the backing plate which would yield to the strain of conforming to the threaded holes in the mounting plate.

8. The combination of Fujitsu and Zejda to include a screwed target assembly is not feasible as the locations and placement of the screws as taught in Fujitsu and Zejda would seriously defeat any attempt to produce a usable sputter target assembly. The magnetic field required for sputtering from a target would be severely obstructed resulting in poor uniformity and wafer substrate coverage, in all likelihood the target would be useless as a sputtering target for the semiconductor industry. This argument does not even consider the fact that the combined contaminants in the cooling water and residual heat from sputtering cause oxidation and/or contamination of any mounting screws which would impinge on the movement during operation of the magnet assembly required for sputtering. Therefore, the location of the mounting screws is of paramount importance in designing a sputter target, and not shown in the documents applied.

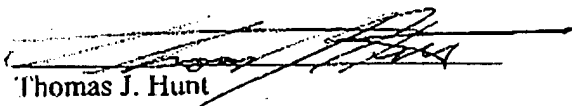
9. Wegmann discloses the manufacture of a sputter target using clamping devices or planes to enhance cooling and facilitates assembly. Wegmann further teaches the creation of cooling channels to be combined with a target as part of the invention. The present application does not seek to create or attach cooling channels to provide additional cooling avenues. Notably, Wegmann teaches a

method of attaching the target to a backing plate with separate cooling channels attached to the assembly, to the mounting surface using screws. Wegmann does not teach a method of adapting a standard configuration sputter target to a mounting surface in a simple, reliable fashion as shown in the referenced application. It would not be apparent to one skilled in the art to apply Wegmann to the present application.

10. Having thoroughly compared the invention with the references of record, I find that the claimed invention is neither taught nor suggested by any of the references, either taken alone or in combination.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully Submitted

  
Thomas J. Hunt

2-5-03  
Date